THE UNIVERSITY OF WASHINGTON

Arboretum *bulletin*

FALL
1963

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THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

A JOURNAL OF GENERAL HORTICULTURAL INFORMATION
PUBLISHED QUARTERLY BY THE UNIVERSITY OF WASHINGTON
ARBORETUM FOUNDATION • SEATTLE 5, WASHINGTON

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VOLUME XXVI, NUMBER 3

Fall, 1963

TABLE OF CONTENTS

Performance Evaluation of Landscape Trees	Philip A. Barker	66
Sasanqua Camellias at the National Arboretum, Washington, D.C.	Francis de Vos	69
Shrubs for the Rock Garden	Robert Bovee	71
Winter Garden Vignettes	Esther Berry	74
Camellia Sasanqua in the Arboretum		75
Propagation Notes for Fall	Lyn Davis	76
Propagation Is Simple	Esther Berry	77
New or Unusual Plants in the Arboretum	J. A. Witt	78
Northwest Members of the Ericaceae	Pat Ballard	80
Dormant Sprays for Trees and Shrubs	David H. Brannon	84
New Members		85
Garden Work in the Fall		86
Leaves from the Arboretum	Richard B. Walker	87
Some of Our Favorites		88
Book Reviews		90

COVER PHOTO:

Juglans Hindsii — close-up of the fruit

PHOTO BY: WILLIAM ENG

Performance Evaluation of Landscape Trees*

PHILIP A. BARKER**

We feel that this scheme has considerable merit for discovering the most suitable trees for different areas and deserves as much publicity as possible. The cities around Puget Sound might well benefit greatly if one was organized here.

IN 1958, when the University of California created a Department of Landscape Horticulture with the research responsibility of studying the cultural aspects of landscape plants, consideration was given to where the research efforts should be directed. It soon became apparent that better information was needed about the performance characteristics of landscape trees, for it seemed that even those who worked professionally with such trees often held differing views about them. The well-known *Magnolia grandiflora* is a case in point. During the summer of 1960, several park officials were interviewed about the performance of this magnolia. From a 17-page questionnaire prepared for that purpose, questions like the following were asked: When do the old leaves drop? When do new leaves appear? When do the flowers appear? Are the flowers fragrant? When does the fruit mature? What are the tree's moisture requirements? What are its soil tolerances? Many of the questions were unanswered, and many answers were at variance with each other. Of the answers obtained, which were correct? Who should decide? The results indicated that more conclusive information was needed if trees of seemingly excellent quality were ever to be substituted for others more commonly used but of possibly inferior quality.

Throughout California, trees are a major concern of each city and county government. What kinds of trees they should plant along their streets and highways, and how these trees should be maintained are questions they share in common.

Therefore, it seemed logical to enlist their assistance in a statewide tree performance evaluation. Such a cooperative study was proposed to a group of city personnel responsible for park and street trees who were invited to attend four organizational meetings in the fall of 1960. At these meetings, specifications were drawn up for cities and counties to follow in planting and maintaining so-called candidate trees on which personnel of the University of California would make the long-range performance evaluations. Considerable time was also spent on selecting "Landscape Tree Evaluation Program" as the title for the study.

The term "Landscape Tree" seemed to best represent the broad-use aspect of the trees to be evaluated, comparable, as it were, to such broad-use terms as fruit trees and forest trees. Further, this term subdivided satisfactorily into such specialized use categories as shade tree, street tree, ornamental or flowering tree, patio tree, and so forth. Some kinds of trees, such as *Koelreuteria paniculata,* probably fit into all specialized use categories, whereas others, like *Lagerstroemia indica,* probably have more limited use.

There was some hesitancy about using "evaluation" in the title, because in an International Shade Tree Conference guide that term refers to the determination of a tree's monetary value. But since it would be precisely an evaluation study, and since the ISTC guide covers a function that with automobiles and real estate is called an appraisal, the word "evaluation" was used.

The word "program" received its share of review too, and was chosen over other equally appropriate words largely because of its less frequent use.

The choice of the title was undoubtedly influenced also by the general view of those attending the organizational meetings that

*Presented at the seventh annual Oregon Ornamental Short Course, Oregon State University, Corvallis, Oregon, February 6, 1963.

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the study represented a significantly new emphasis in determining a tree's performance characteristics. Whereas food and fiber are the eventual products with fruit and forest trees, the end product of trees in the urban landscape is mostly that of modifying the environment in such a way as to increase man's physical and mental comfort.

With the Landscape Tree Evaluation Program organized, the next step was to activate it. Most of the first-year participants were those represented at the organizational meetings. Since then, an invitation to participate in the study has been sent to cities having a population of at least 5,000 people, and to all counties. Two copies of a Candidate Tree Request form have been included with these invitations. Whoever chooses to participate returns both copies of this request form. On a cutoff date—December 17, 1962, for the 1963 candidate trees—the requests are reviewed and if enough trees are available each participant is allocated the number requested. Otherwise, the number allocated may be less than requested. Requests received after the cutoff date are allocated trees if any are still available.

Upon making the allocation, one copy of the request is returned to the participant with instructions on how to order the trees. In 1961, participants ordered them through their local retail nursery, requesting that the nursery get the trees from the designated grower. In 1962, some of the participants ordered the trees as before, whereas others ordered them direct from the grower. Because we delivered the trees ourselves in 1963, participants were instructed to send their order direct to the wholesale nursery from which we obtained the trees. Using a rented van-body truck, we delivered most of them during the week of January 21. This earlier, and much shortened, delivery period should result in most of the trees being planted ahead of the rainy season, or at least before the trees begin growing.

So that all the candidate trees will be treated as nearly alike as possible, participants are asked to follow certain planting and maintenance specifications. These specify December through March as the planting period. Initially, a certain planting method was also specified, but this has been relaxed because participants thought the specified method might suggest to local residents that their own planting method was inferior. Staking practices have varied so much, however, that one staking method is being recommended in 1963. It consists of using two 2″ x 2″ x 8′ stakes and one 1″ x 1″ x 10′ center stake to support the tree for 3 to 4 years so as to enable pruning to a modified central leader.

The candidate trees have been planted in parks and along streets. Experience has indicated that street plantings may be more representative of the cultural practices that a tree would ordinarily receive in most of the situations where it might be used. Therefore, participants are now encouraged to plant them along streets. Also, it is preferred that each kind be planted in one location rather than dispersed throughout the community.

At the end of each growing season, the performance of the candidate trees is evaluated. This includes determinations of height and trunk diameter, pest incidence, foliage quality, and hardiness, all of which reflect environmental influences plus cultural variabilities. Of the latter, homeowner watering practices will probably always be a serious and yet uncontrollable variable in the LTE program.

Participants are notified in advance of our evaluation schedule and invited to assist. Usually they have done so gladly, recognizing that such an occasion can be valuable learning experience, affording them the opportunity of reviewing principles of plant growth and pruning practices, and also of checking the performance of their own candidate trees. This learning experience was anticipated, but it was not foreseen that this dividend of the LTE program might turn out to be as valuable as the acquisition of information about the trees' performance.

Another dividend that accrues to the participant is the favorable impression it makes on the residents of the community. News re-

leases are prepared for the participants to send to their local news media when the candidate trees are planted. Also, description sheets about each candidate tree and the LTE program are sent to the participants for them to pass on to the homeowners along whose street the trees are planted. Except for the first paragraph, which gives the name of the tree and a little information about it, these description sheets are the same for all candidate trees. One reads as follows:

Your Street Trees

The newly planted trees along your street are Chilean peppertree, *Schinus polygamus*. These evergreen trees differ from the more common California peppertree by having single leaves rather than compound leaves. They are expected to grow fairly rapidly to a mature height of about 25 feet.

Their growth rate and other performance characteristics are to be evaluated for the next several years. Trees like them, as well as other kinds, are also being planted in other parts of the state as part of the Landscape Tree Evaluation program, a cooperative study by participating cities and counties and the University of California.

You are invited to assist in this study by seeing that your tree is watered deeply once a week during the first growing season (spring and summer, 1963). Then water it deeply every two or three weeks during the succeeding growing seasons. Do not prune or fertilize it, as this will be done by the LTE evaluators. *Please protect it from harm.*

If you have any questions about your tree or if you wish to report on its condition, please contact your community government by telephoning:

Name .....

Telephone .....

These public-relations activities help acquaint residents of their community's research efforts with the University. To tie in with these, some participants have even scheduled the planting of the candidate trees as part of an Arbor Day ceremony, with the mayor and other community leaders present.

Participants are kept informed about developments in the LTE program by a newsletter entitled *Tree Topics*. Six were issued in 1962.

In order to continue having bi-directional communication in the LTE program, participants and interested non-participants were invited to attend either of two review meetings in December, 1962. One was held in the Los Angeles area and the other in the San Francisco Bay area. Also, an LTE Advisory Committee was recently organized. Its principal membership is six participants from throughout the state, plus representatives of the nurserymen and landscape architects. This committee will meet once or twice annually to review the LTE developments and to make recommendations on policy matters, including the selection of each year's candidate trees.

Regardless of how well organized and how much public opinion is influenced, the success of this research effort will, in final analysis, depend on the promulgation of better information about a tree's performance. Choosing a tree and getting it produced, distributed, planted, and evaluated are but step-by-step processes leading to this objective. Such an objective is several years away even from the time the tree is planted. However, with the greater number of candidate trees being planted annually, the prospects are bright that such information will be forthcoming for various trees.

In 1961, the first year in which the LTE program was operational, 54 trees each of *Ginkgo biloba* 'Autumn Gold' and *Tristania laurina* were planted in eleven participant locations. The next year, 192 *Eriobotrya deflexa* and 254 *Osmanthus Americanus* were planted in twenty-nine participant locations. This year, 1963, thirty participants have received 446 *Fraxinum holotricha* 'Moraine' and 357 *Schinus polygamus*.

By 1963, most of the participants planted twelve of the *Fraxinus* and eight each of two sizes of the *Schinus*. A participant in the Bay area is planting fifty-four of the *Fraxi-*

(Continued on Page 88)

Sasanqua Camellias at the National Arboretum, Washington, D.C.

FRANCIS DE VOS*

This is a valuable account of the attempt to establish a collection of forms of Camellia Sasanqua in the National Arboretum and well illustrates the kind of work which arboreta should perform for their local areas. We are grateful to Dr. de Vos for his contribution to our knowledge of the subject, and regret that plans to have similar reports from England and Oregon have not materialized.

FOURTEEN years ago the first sasanqua camellias were planted at the National Arboretum in Washington, D.C. At that time sasanquas were little grown in this area. This is still true today. Critical analyses of the Arboretum's planting and of the merits of sasanquas suggest reasons why this is so.

The sasanquas at the National Arboretum are planted below the crest of a moderately steep east to southeast-facing slope. White pines and large deciduous trees help to break the force of cold, dry northwest winds that sweep into this area during winter. High-trimmed tulip trees and oaks provide light summer shade. An informal planting of cryptomerias creates pockets of shade throughout the year. The soil has a pH range of 4.5-5.5 and is well drained and low in fertility. No fertilizing is done, however, and watering during periods of drought is the only concession to a cultural program.

For the most part, the Arboretum's collection of several hundred sasanquas represented by approximately 100 cultivars has thrived under the aforementioned conditions. Over a 10-year period some of the more vigorous cultivars such as 'Cleopatra,' 'Papaver,' and 'Willow Leaf' have grown 10 to 12 ft. in height. Flowering, however, has been somewhat erratic and seems to be related to the amount of light received. A cultivar that flowers abundantly in a site that receives one-half of full sunlight, or its equivalent, each day during the growing and flowering seasons produces fewer and fewer flowers under progressively shadier conditions. Not only is the number of flower buds decreased but the time of flowering is delayed to a critical point. This was dramatically shown one fall when tardy leaf fall of deciduous trees produced shadows that delayed flowering on cultivars that normally completed their blooming before cold weather so that little or no blooming resulted despite heavy flower bud set. A site that provides a combination of some winter shade, protection from winter winds, and at least 50% of full sunlight during the summer and fall is best for sasanquas in the Washington, D.C., area.

Before the extensive sasanqua plantings were developed at the National Arboretum, it was common to hear that sasanquas were hardier than japonicas. The basis of this opinion probably was observations in the southeastern states, where sasanquas consistently complete most of their flowering before cold weather and where winter temperatures are usually not low enough to cause cold injury to the plant. Unfortunately, this opinion prevailed long enough for thousands of sasanquas to be sold in areas where there was little or no chance of success.

The period during which sasanquas have been grown at the Arboretum, Washington, D.C., has had some of its coldest weather on record. During one cold snap in the winter of 1957-58, the temperature ranged between +4° and 12° for two days and there were almost constant winds of 25 to 40 mph. A low of −2° was experienced in 1961 and during the winter of 1962-63 the average minimum was the lowest in twenty-eight years. Observations of the plantings at the National Arboretum, Washington, D.C., over a number of years, revealed that (1) one- to three-year-old plants of a cultivar are less hardy than well-established older plants of

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the same cultivar; (2) flower buds were killed or developed into poor quality flowers after exposure to +18°, a temperature usually experienced in the Washington area between mid-November and mid-December; and (3) sasanquas are bush-hardy to about +5° although considerable winter burn of the foliage results at higher temperatures, especially on plants in the winter sun. The consecutive cold winters of 1961-62 and 1962-63 resulted in 10-year-old plants of 'Rosy Mist,' 'Showa-no-sakae,' 'Mine-No-Yuki,' and 'Shishi-gashira' being killed back by 50 to 75% over a two-year period. On the basis of these observations, Washington, D.C., must be considered a borderline area for growing sasanquas on the east coast.

The primary reason why sasanquas are not widely grown in the greater Washington, D.C., area is the lower winter temperatures experienced in the suburbs. Temperatures 5° to 10° lower than those experienced at the Arboretum, which is within the city limits, are common and have usually brought a quick end to any attempts to establish plantings in suburban gardens. Failure to select planting sites receiving enough sun to assure flower-bud set and hasten flowering in the fall has undoubtedly contributed to the disappointments experienced. Undoubtedly, many failures can be traced to the purchase of small plants. The lack of public acceptance of sasanquas is probably not entirely due, however, to environmental factors. Sasanquas have an ungainly growth habit, particularly in their early years, whereas the public's preference is for compact-growing plants. Also, cut flowers of sasanquas shatter easily and are a disappointment to those that know the excellent keeping qualities of its more illustrious cousin, *Camellia japonica*.

While the Arboretum has had some disappointing years with its sasanquas and the threat of destructive cold winters is always present, we are continuing to recommend sasanquas for use in the city and warmer areas in the suburbs. Their horticultural merits, ease of culture, lateness and showiness of floral display, the simple beauty of single flower forms, and the attractive year-round evergreen foliage are certainly worth the gamble.

Some of the more showy varieties that can be recommended for use in Washington, D.C., are as follows:

Cleopatra—Rose pink, semi-double, compact, upright growth.

Crimson Tide—Red, single with ruffled petals.

Hino-de-Gumo—White shaded pink, large, single with fluted petals.

Jean May—Shell pink, large, double.

Narumi-gata—White shaded pink, large cupped, single.

†Papaver—Soft pink, large, bell-shaped, single, narrow upright growth habit.

Pink Snow—Light pink with lavender trace, large, semi-double.

†Rosy Mist—Pink, large, single (fig. 8).

Setsugekka—White, large, semi-double.

†Shishi-gashira—Red, medium, semi-double.

†Show-no-sakae (Usubeni)—Soft pink, occasionally marbled white, medium large, semi-double to rose-form double.

†May be injured during cold winters.

Camellia Sasanqua 'Rosy Mist.'

FIG. 8 PHOTO BY F. DE VOS

Shrubs for the Rock Garden

Robert Bovee

Mr. Bovee of Portland, Oregon, gave the third of the series of lectures sponsored by the Arboretum Foundation in January, 1963. Mr. and Mrs. Bovee brought many beautiful color slides of their own garden and, as a rare treat, they also showed slides of one of the most unique gardens in the Pacific Northwest—that of Mrs. A. C. U. Berry, also of Portland. The Education Committee and the Editorial Board are most grateful for permission to publish their lecture notes.

IN THIS discussion we will cover some of the interesting plants in two gardens—that of Mrs. A. C. U. Berry and our own woodland garden. The garden of Mrs. Berry covers some six acres, much of it quite heavily wooded with native trees. Her present garden is about thirty years old but many of the plants in this garden are of greater age, having been moved to their present location from a former garden within the Portland city limits. A great amount of the material in this garden has been raised from seed collected from the wild. Mrs. Berry subscribed to most of the early plant expeditions carried on by George Forrest, Kingdon-Ward, Dr. Joseph Rock, and others. From just one of these expeditions she received over 1000 kinds of seeds and bulbs of alpines, trees, shrubs, rhododendrons, and many other plants. There are rhododendrons in this garden—literally hundreds of them—over ten feet in height.

Her first love is probably for the alpines which she grows to perfection—particularly *Primula*. The importance of the plant material in this garden has long been recognized by knowledgeable gardeners in the northwest, but not until the International Rhododendron Conference was held in Portland in May, 1960, was the real value of this plant material realized. Hundreds of visitors spent hours in this garden, — a good number of them outstanding plant experts of England, Scotland, and other countries, as well as of this country. It was often remarked that this was certainly one of the outstanding plant collections in this country, and that it could be THE outstanding one. A plant expert from Scotland said that he saw plants blooming in this garden that he had never seen bloom before, and some which he had never heard of.

We have been fortunate in being able to visit this garden almost every week for the past several years. Always worthy of a special trip, early in the spring, is the amazing blue crocus of Chile, *Tecophilea cyanocrocus*. We have not seen a flower of such a wonderful true blue color. This bulb is said to be quite hardy but, because it commences growth very early in the spring and then quickly comes into bloom, it is grown in a deep cold frame where it may be easily protected from frost.

Another excellent alpine is *Rhodohypoxis Baurii,* native to South Africa. This is also grown in a cold frame in Mrs. Berry's garden but has been tried in the open, on a steep hillside where drainage is sharp, and is doing spendidly. We have grown it in a raised bed for a number of years and it has done well for us. This has been reported on the tender side but it is native to a dry country and does not like our winter damp. Failures with *Rhodohypoxis* in the past may be due more to lack of extremely sharp drainage rather than cold.

Corylopsis pauciflora is a spreading plant, eight feet across, about four feet tall. It is planted on top of a rock wall in about half sun where it does extremely well. It is related to the witch-hazels and follows them in bloom, with somewhat larger yellow flowers.

There are some ten or twelve large scree beds in this garden, especially prepared for the growing of alpine plants. Most of these beds will cover an area of approximately eight by twenty feet. To insure perfect drainage, which so many alpine plants demand, the bed is first dug to a depth of three or four

feet, and two feet of rock and heavy gravel is placed in the bottom. The remainder of the area is filled with a scree-bed mix, finely sifted through a quarter-inch mesh screen. Most of these beds are raised a foot or two above the soil level, by heavy logs placed along the edges of the bed. In the beds where different types of alpine plants are to be grown, interesting large rocks are placed to form miniature rockeries. Alpine plants grow to perfection under these conditions, even those considered difficult, and a great many seed themselves throughout the scree bed area. These beds are located where they get sun most of the day.

Among the many fine plants grown in the scree beds; — a *Crassula* from Africa does wonderfully well over a log on the edge of a bed. Many forms of *Dianthus,* tiny alpine willows flat to the ground, *Delphinium nudicaule* 'Orange Queen' and *D. Zalil* — a fine yellow species from Persia. A handsome purple geranium was collected in the Siskiyou Mountains. Many forms of *Cassiope,* some grown from collected seeds which have not yet been identified, forms of *Roscoea, Calceolaria Darwinii* from Patagonia, *Draba polytricha* from Armenia, *Fritillaria citrina,* a lemon-yellow from Greece, as well as many other forms of this plant, and—deserving special mention—a beautiful double white *Trillium.*

The primulas in this garden are outstanding. Many are grown massed in large beds, such as *Primula rosea, P. Poissonii* from Yunnan, *P.* 'Tyee' — Candelabra Section — and a very large bed of yellow *P. Auricula.* All the primulas are grown in a shaded part of the garden, with the exception of *P. Auricula.* Five large cold frames are filled with some of the more rare and tender types. A hybrid of *P. rosea* x *P. Clarkei* is a fine pink. Mrs. Berry's own *P. denticulata* seedling, with extremely large leaves, is also an excellent pink, while the tiny *P. Clarkei,* — very rare, — easily sows itself among the other primulas.

Her own strain of show auriculas is most beautiful. They are grown in a cold frame in a sunny location. Many are extraordinary blends of greys, greens, and yellows. Water is never allowed to touch their foliage or flowers during the blooming season. When watering, it is necessary that the bed is flooded from the bottom.

Other plants deserving special mention are a mass planting of *Bulbocodium* from the Alps, *Narcissus cyclamineus* from Portugal, and *Cytisus demissus* from Greece. A tiny fern, collected from the Olympics, is most handsome in heavy shade in a bed near her garage, as are several other collected ferns, while the tiny creeping fern, spreading by underground stolons—*Blechnum pennamarina* —forms a lovely groundcover in shady spots in the garden. This fern is not heavy rooted or invasive and could be used as a groundcover for larger plants, but it does demand a soil filled with humus and protection from hot sun. It spreads quite rapidly.

An outstanding and most rare plant is a tiny form of *Betula nana,* collected in Alaska eight or nine years ago. Only a couple of inches tall, it can be covered with your hand. It grows in a sunny location in a scree bed. The type plant of *Betula nana* is thirty years old in this garden, about thirty inches tall, with a spread of four feet or more and a mass of long, wiry branches. The lovely *Viola Flettii,* collected in our own northwest, does well in a scree bed, as do several forms of *Lewisia. L. Howellii,* pink flowered, is most outstanding. A large planting at the end of a scree bed puts on a wonderful show each spring. These lewisias appreciate a mulch of pea-size gravel which keeps the roots cool and protects leaves from resting on the soil, preventing leaf rot.

Kalmiopsis Leachiana 'Le Piniec', a very fine pink, grows easily among the rocks in a scree bed. The original type of *Kalmiopsis* was found in the Siskiyou mountains quite a number of years ago, but this new, compact form was discovered just a few years ago, along the Umpqua River in S. Oregon. The original form was difficult to grow, but the 'Le Piniec' type is quite easy. However, it should be planted in a permanent location when very young. It resents being moved.

Other plants of it in this garden grow well in crevices in the rocks. It demands a scree soil with sharp drainage.

Another exceedingly rare plant, grown extremely well in this garden, is *Rhodothamus Chamaecistus*. This scarce alpine, once considered a rhododendron, is difficult to grow but here it is a foot or more in width and blooms quite freely. It also appreciates a position among the rocks in a sunny scree bed.

Gentians in many forms, whites as well as blues, are mass-planted in special beds. *G. sino-ornata,* a big bed eight to ten feet wide by twenty feet long, is a mass of deep blue flowers in September. *G. angulosa* is mass planted and blooms earlier, as do two forms of *G. acaulis,—Clusii* and *dinarica*. Here in these sunny, well-drained beds gentians bloom heavily every year.

The greater part of the Berry garden is filled with many forms of species of rhododendrons. Literally hundreds of plants are above eight feet in height and over twenty-five years old. Practically all have been raised from seeds obtained from early collectors. The award form of *R. Degronianum,* now planted at the Portland Test Garden, came from here. It is low and compact, with soft pink flowers. A deep pink form also is fine. There are twenty or more big plants of this species here. A bed of *R. glaucophyllum* contains twenty to thirty plants, all about three feet tall and spreading four to six feet. The color is quite uniform, a very good pink.

An interesting group of plants probably came from *R. Williamsianum* seed. They are natural hybrids, with flowers similar in character to 'Bow Bells' but in a color range from very light pink to almost red. These are all low-growing, spreading plants. The flowers are heavy in substance, almost waxy.

Twenty-four types of magnolias are grouped on a hillside. All are quite large plants. A very excellent pink *M. Campbellii* bloomed for the first time two years ago. The large flowered yellow *Hypericum* "Rowallane Hybrid," while somewhat tender, does well in a protected spot near the driveway, and the orange-red quince 'Rowallane' is most striking in the shrub border. It is dwarf and widely spreading.*

We have used many forms of dwarf rhododendrons in the landscaping of our home, including *R. Williamsianum* and a number of its hybrids. A planting of over twenty rhododendrons — 'Bowbells', 'Moonstone', 'Arthur J. Ivens', 'Wilbar', 'Jock', 'Mission Bells' —, all twenty to thirty years old, have proven satisfactory and easy to control, massed in front of our low-to-the-ground home. This bed is edged with the neat, rounded, pink-flowered *R.* 'Rose Elf', P. A. form. It is a cross of *R. racemosum* and *R. pemakoense,* likes the sun and blooms heavily.

Along the driveway are some thirty plants of *R. racemosum* and its hybrid, 'Twinkles', blending through the mauve-pink of *R. cuneatum* to the deep purple of *R. russatum.* These plants bloom together, under a spreading 'Mt. Fuji' cherry. In another part of our garden, very early in the spring, the tall form of *R. Keiskei* blooms with the lavender-blue of Joe Gable's hardy 'Conemaugh'. Near it is the nice dwarf *R. Keiskei,* with its lemon yellow flowers. This hardy little plant often sets buds on a two-inch plant. It is best when protected from the hot west sun.

Across the top of a low rock wall grow a number of dwarf shrubs and rhododendrons which need only light shade. A rare creeping sequoia — probably fifteen years old, a foot tall, spreading to two feet — grows well. We do not gnow its origin. *S. sempervirens* 'Albospica' has a somewhat similar growth-habit but with variegated tips. A form of *R. Williamsianum,* unusual in that it will bud on three-year-old cuttings, is planted here as well as other dwarf rhododendrons and a number of plants of the true *Andromeda. Prunus* 'Tai-Haku', with its two and one-half inch flowers, and a fine specimen of *P. incisa* var. *serrata* give light shade. This latter tree has small white flowers, a very graceful growth habit, and is one of the earliest

*The original plant at Rowallane, N. Ireland, was at least six feet tall in 1938-40.—*Editor.*

(Continued on Page 90)

Winter Garden Vignettes

ESTHER BERRY*

PAEANS of praise have been sung to the blossoms that unfold in the spring; there is no disputing their beauty and the joy that they bring but it is an unfortunate truth that the beautiful spring garden is too often bare of color during the season that we need it the most. A little bit of color can be a big thing during the dark days of winter.

Winter has a very special charm of its own if you plan for it. Few properties are so small that they cannot afford space for a winter garden in miniature. Since one is not out in the garden so very much during blustery weather, it is important to locate your winter garden where it will be seen most often from inside the house or perhaps near an entrance door where the family will see it as they come and go. I look into my winter garden while standing at the kitchen sink and since I do this quite a lot in winter, it serves to lift my spirits when the need is greatest. The rest of the family see it, I hope, as they go to and from the garage. The kitchen door is the only one used at our house, except on state occasions.

*Mrs. (Robert) Berry, of our Editorial Board, is one of its most faithful members, notwithstanding it means a trek of over 160 miles (to and from Aberdeen, Washington) to attend the Board meetings.

For me, winter begins when the leaves fall and ends with the first tender green of spring, and there is no dearth of plant material to provide color for this season; on the contrary, the difficulty is to limit one's choice to fit the available space. Many people seem reluctant to use deciduous plant material in an area that is on view in winter and this is regrettable for it is here that we find the unique beauty of winter. Many of our choicest winter flowering shrubs are deciduous. It is only when they have shed their leaves that they unveil the intricate pattern of their branches and display their beautiful form. The delicate tracery of their dainty flowers upon the bare branches has an exquisite beauty of its own that would be lost if the borders were filled with color. Deciduous material is most effective when it is woven into a design of evergreen plants which give it the needed substance.

I expect that good design might dictate that there should be a balanced distribution of winter color throughout the garden but I prefer to concentrate on one area. I believe they make a better display when massed together. It's true that the area is without color during the rest of the year except where such plants as *Hamamelis mollis* color in the fall

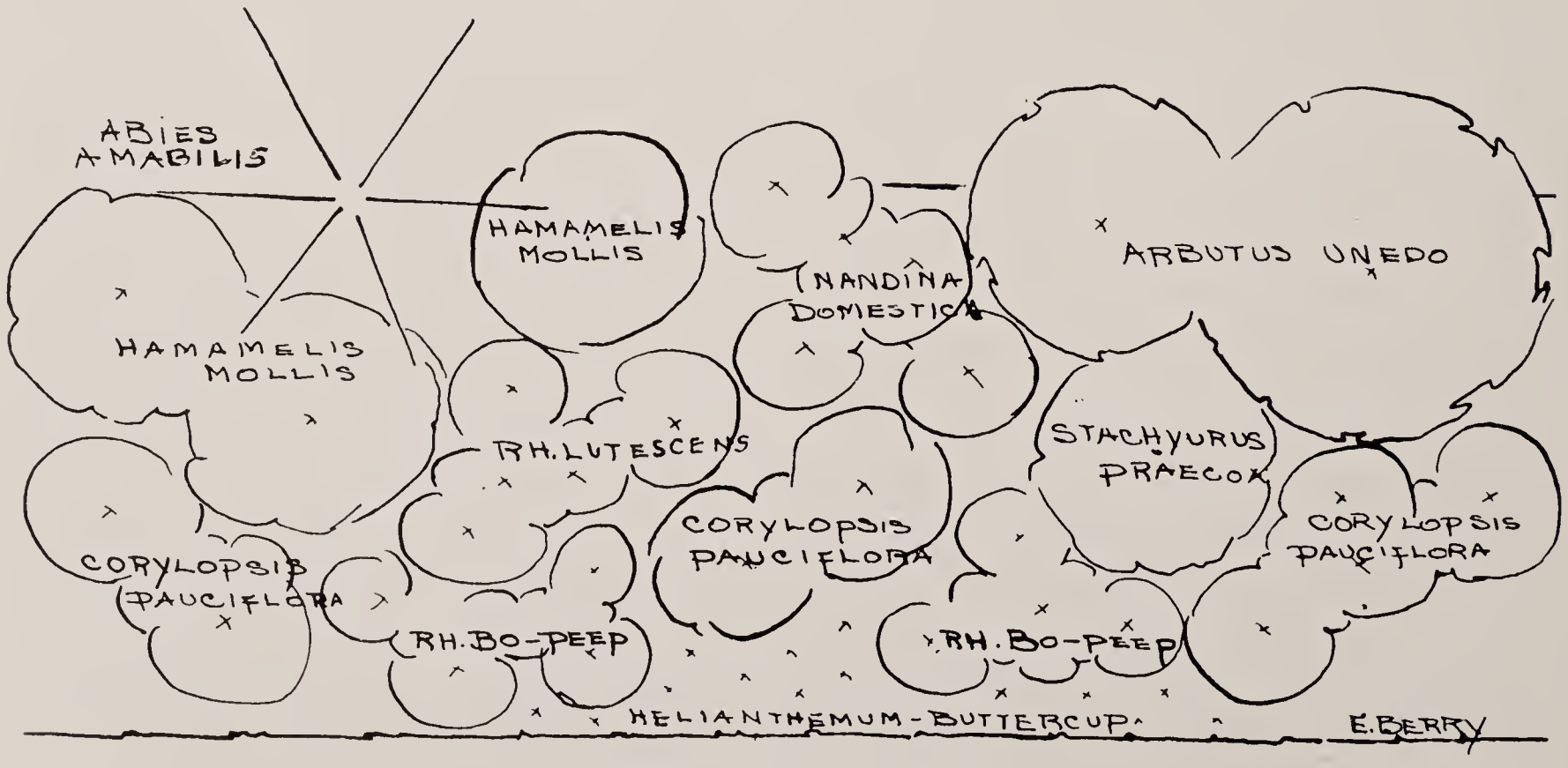


FIG. 9 A Winter Garden Sketch BY: MRS. BERRY

but it is neat and green and I don't miss the color when there is so much in the rest of the garden.

If you have a spot where you can use an autumn cherry, *Prunus subhirtella autumnalis,* a planting of *Rhododendron mucronulatum* 'Cornell Pink,' backed by the white camellia, 'Joshua Youtz,' and faced by *R.* 'Tessa' and *R. cilpinense* with a carpet of 'King George' heather woven into the front, this would give you that June in January feeling for quite a while.

If your 'best location' should turn out to be a rather shady corner, try *Fatsia japonica* combined with *Mahonia Bealei* and the white-berried form of *Skimmia japonica,* using quantities of the white *Helleborus niger altifolius* and *Rhododendron* 'Bric-a-brac' in the foreground.

Camellia Sasanqua may be grown in tubs or planters. I like them best espaliered against a wall or on a fence where their polished leaves are handsome at any season, but it really seems like a divine dispensation when they flower in the middle of winter. They are especially effective if they can be grown in an entry way where the blossoms have a little protection from the weather.

Your winter garden may be a single plant of Rhododendron 'Lee's Scarlet' growing by the gate where it will bloom just after Christmas if the weather is mild, or a pyracantha on the chimney wall, or any of the delightful early bulbs that you can tuck into little pockets along a much used path. There are dozens of lovely things to choose from so there is no need for you to let winter catch you unprepared.

Camellia Sasanqua In the Arboretum

THE Arboretum has had a number of *Camellia Sasanqua* clones since 1941 when some forty-four cultivars were imported from Japan, but we have no such collection as has the National Arboretum. The latest count gives us about twenty clones growing in the Arboretum and about half again as many unnamed forms. There are two main areas where these are growing; the Winter Garden, and at the east end of Rhododendron Glen, on both sides of Arboretum Drive E. and along the Broadmoor fence. Those planted in the Winter Garden were put there in 1949 and some are over fifteen feet tall. They are quite shaded, however, receiving less than the fifty per cent full sun recommended by Dr. de Vos and White. They usually bloom each fall and early winter but none can be said to flower profusely.

The group along Arboretum Drive E. has not been established as long; most of the plants were put in after 1956. Those which are in or near the Mary E. Williams camellia planting receive nearly full morning sun, but are protected from it by large trees to the west. The group along the Broadmoor fence is very sheltered and gets little but filtered sun at any time. The clones that are exposed to some sun have flowered much better than the sheltered plants, some of which haven't bloomed since they were moved there in 1957.

One of the finest and most floriferous of our *Camellia Sasanqua* clones, 'Tago-no-tsuki,' however, is on the north face of the restroom building and very seldom gets any sun at all, even in mid-summer. We also find that the plants in the lath house, waiting to be given permanent locations, flower well, although they are often delayed until November or December and sometimes even until January. Since it is rare for our area to have sharp freezes in November and early December the late flowers usually survive.

They certainly seem hardy enough for most of the Puget Sound region. We lost some to the savage November 1955 freeze but in no greater proportion to the total number than with the *C. japonica* clones; probably less.

J. A. W.

Propagation Notes for Fall

LYN DAVIS*

IF YOU still have room in your cold frame, hot frame, or greenhouse for additional stem cuttings, there is a large variety of plants that can be taken in the fall months. We've found it much easier to take care of cuttings in the fall, with vacations over, and without the danger of flats drying out from the summer heat.

The wood of many of the summer-flowering evergreen shrubs is not ripe enough for semi-hardwood cuttings until fall, and with a good growing summer such as we've experienced this year, second growth shoots are obtainable on numerous spring-flowering shrubs as well. It's a good idea to take cuttings now of half-hardy plants that might be lost in a severe winter, if you haven't done so already.

Hardwood evergreen cuttings, which is material from the current season's growth which is fully dormant, are usually taken in November and December after a frost. Hardwood cuttings of deciduous flowering trees and shrubs are taken any time after the leaves fall, usually before February.

In an attempt to check the best time for propagating specific plants from cuttings, we are making up a list of results obtained from propagation in the Unit Council Greenhouse during the past four years. Posted in the greenhouse is the list covering October and November. The data was compiled from the greenhouse record book and includes only those plants for which complete results are obtainable. Below are listed some of the plants propagated during the past three years in the fall for which the results were generally successful, and where the number of cuttings involved was sufficient to warrant a conclusion.

*Mrs. Donald C. Davis is a member of the BULLETIN Editorial Board, a competent propagator and skilled gardener.

OCTOBER

Plant Name	Date Taken	Number Cuttings	Date Potted	Number Potted
Andromeda Polifolia	10-13-59	22	1-20-60	19
Arctostaphylos media	10-27-59	56	1- 3-60	52
Ceanothus thyrsiflorus 'Sierra Blue'	10-11-60	41	1- 4-61	30
Erica Tetralix 'Alba Mollis'	10- 3-61	13	11-29-62	7
Euonymus Fortunei var. *radicans*	10-27-59	45	1- 3-60	44
Gaultheria Itoana	10- 9-62	18	1-22-63	18
Osmarea Burkwoodii	10-25-62	65	2-15-63	23
Pernettya mucronata	10-24-62	20	2-12-63	14
Raphiolepis ovata	10-25-62	20	2-12-63	19
Rhododendron 'Christmas Cheer'	10-17-61	50	3-27-62	32
'Racil'	10-19-60	26	1-17-61	19
'Rosamundi'	10-23-62	13	3-26-63	4
Sarcococca confusa	10-19-60	11	2-21-61	8
Skimmia japonica	10-13-59	49	1-12-60	42
Stranvaesia Davidiana var. *undulata*	10-11-60	12	1- 4-61	12
Vaccinium Vitis-idaea var. *minus*	10-13-59	72	1-12-60	45

NOVEMBER

Arctostaphylos columbiana	11- 1-60	25	2-14-61	20
Calluna vulgaris 'Searlei'	11- 7-61	12	1-23-62	12
Camellia Sasanqua	11-28-60	16	2-27-61	14
Ceanothus griseus var. *horizontalis*	11-28-60	23	2-27-61	14
Cotoneaster Dammeri	11-28-60	18	2-27-61	11
Daboecia azorica	11- 8-61	6	1-23-62	6
Erica cinerea 'Atrosanguinea'	11- 8-61	31	1-23-62	24
Erica 'Dawn'	11- 8-61	31	1-23-62	24
Elaeagnus pungens	11- 9-62	6	2-12-63	6
Escallonia macrantha	11- 1-60	19	1- 4-61	18
Gaultheria cuneata	11-28-60	20	2-27-61	18
Loropetalum chinense	11- 8-60	60	2- 1-61	58
Osmanthus heterophyllus (ilicifolius)	11- 1-60	25	2- 1-61	24
Pernettya leucocarpa	11-28-60	36	2-27-61	29
Pyracantha Rogersiana	11-28-60	35	2-27-61	23

Propagation Is Simple

ESTHER BERRY*

THESE comments on the propagation of rhododendrons are offered, not because I feel that the methods I use are the best—I'm quite sure that they are not—but because they will give reasonably good results to non-professionals with little equipment.

I have a small cold frame with an inexpensive plastic soil cable that I have used for six years which has provided more plants than the average gardener could possibly use.

After some experimentation I have decided that it is easier for me to set cuttings in flats and then place the flats in the frame; my first year I put the cuttings right in the frame and the roots became entangled with the hardware cloth in the bottom and I had no choice but to cut them loose. It is best to use small flats for it may be necessary to move them about as you work in the frame and they are heavy after they become water-soaked. For the rooting medium, I use two parts of rather coarse sand and one part peat moss. After the flats are filled I water them thoroughly before putting the cuttings in.

In preparing the cuttings, I use a new single edge razor blade each time that I work; a nurseryman once told me that he thought it important not to bruise the tissues of the stem and the razor blade works better than any knife I have found. If the stem is too hard to cut easily with the blade, it is probably too hard to root. Dwarf varieties should be cut about one and a half inches long, others no more than two or three inches. If they are too long you won't be able to get them low enough in the flat. Remove all but three leaves, then take a thin slice from the side of the stem without cutting all the way to the base. They are now ready to dip in Hormodin #3. I make a hole in the sand mix and insert the cutting. I don't firm them in at all but water them thoroughly before putting the flat in the frame. The thermostat is set at 70° and the frame is kept tightly closed. I water daily if the weather is warm and bright; as the weather becomes overcast in the fall, once a week will be often enough, provided it is done thoroughly. If the frame is exposed to full light, as mine is, it may be necessary to cover it with a piece of white cloth on very sunny days. I'm sure it would be much better if the frame were constructed to face north. The Nearing frame described in David Leach's book, "Rhododendrons of the World," looks to be much more satisfactory type of frame than the usual cold frame. He states that he is able to root 94% of his cuttings without heat by using this frame and a hormone treatment that he calls the eighteen-hour soak.

Last fall I tried the soak treatment on a number of cuttings although I still used the heated frame. He recommends that the stems of cuttings be soaked for eighteen hours in an aqueous solution of indolebutyric acid. I found it useful in rooting cuttings late in the season that would usually be too hard to root in good numbers. I was also able to root some difficult varieties with which I have been unsuccessful before. I believe that with some further experimentation to determine proper concentration of the solution. I will be able to root these in larger numbers. In general, this method gave less satisfactory results with dwarf varieties than I have had with Hormodin #3 and is no better with most of the larger varieties when they are taken early in the season. This method takes a little more bother and I do not see much value in its use on varieties that root readily with Hormodin #3 and bottom heat. If you have an unheated frame, it would certainly be worth trying. He also points out that it is possible to use a flat covered like a quonset hut with plastic to root cuttings. I have rooted evergreen azaleas in this manner, using only the hormodin powder, but have not tried it with

*See also Mrs. Berry's delightful article and sketch on Page 74.

rhododendrons. If you use this method be sure that the flat is never in direct sunlight.

The propagation records cover only the past two years and they are certainly sketchy at best. There has been no rhyme or reason for the time that cuttings were taken or for their number — it was a simple matter of whim or convenience. Also there are so many variables in my operation that it would be a mistake to try to draw any positive conclusions from them but perhaps they may be an indication of the probable results that others might expect. It really is so very simple and you feel so creative that it gets to be compulsive.

The following is a representative selection of the results obtained:

Rhododendron	18-hr. soak (1962)	Hormodin No. 3 (1962)	Hormodin No. 3 (1961)
Augustinii Tower Court		5/ 8—Sept. 23	0/ 8—Oct. 23
Broughtonii Aureum	9/16—Oct. 26		5/15—Oct. 15
Carita	4/ 9—Nov. 4	0/ 5—Sept. 23	7/18—Oct. 10
Cilpinense		12/12—Aug. 17	22/26—Oct. 23
Dame Nellie Melba	18/20—Nov. 1	5/ 5—Sept. 23	
Diva	16/17—Oct. 26		5/ 5—Oct. 15
Dormouse		4/ 8—Sept. 26	3/ 5—Oct. 15
Lee's Scarlet	1/ 5—Oct. 18*	5/ 5—Sept. 21	
Luscombei	2/ 9—Nov. 1		5/10—Oct. 11
Margaret Dunn	12/15—Nov. 4		8/ 8—Oct. 11
Marinus Koster	5/ 5—Nov. 1	5/ 5—Sept. 23	2/ 9—Oct. 15
Moonstone		6/ 7—Sept. 23	4/20—Oct. 12
Mother of Pearl	5/ 5—Nov. 1	5/ 5—Sept. 23	1/ 9—Oct. 15
Mrs. Betty Robertson	9/10—Nov. 1	5/ 5—Sept. 23	
Olympic Lady	0/10—Nov. 1	5/ 6—Sept. 23	2/ 9—Oct. 12
Purple Splendour	18/21—Nov. 4		10/18—Oct. 15
Souv. of W. C. Slocock	15/18—Nov. 1	4/ 5—Sept. 23	7/32—Oct. 13
Tessa	0/20—Oct. 26	5/ 8—Sept. 23	
Unknown Warrior		4/ 5—Sept. 23	3/14—Oct. 15

The 18-hr. soak column indicates those given the treatment recommended by Mr. Leach. The * indicates 1½ times the usual concentration of chemical. The first number of the fraction indicates the number which rooted, the last is the number of cuttings taken. So that if one out of four rooted that would be 1/4 of the total taken.

New or Unusual Plants in the Arboretum

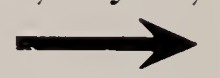
13. *Itea japonica* Oliver

J. A. Witt

THERE is a surprising number of plants of the same genera that are found both in Japan and N. E. Asia and in the eastern part of North America. These include, in part, *Magnolia, Nyssa, Chionanthus, Jeffersonia* and *Itea*. This discontinuous distribution, i.e., the fact that there are two similar groups of plants found many thousands of miles apart, has intrigued botanists since the middle of the last century. The great American botanist, Asa Gray, was among the first to note this disjunct distribution and postulated that at one time there was a similar flora forming a continuous band across North America and down into N.E. Asia. This continuity was then broken by glacial advances which destroyed the connecting link but left the two ends to develop similar but distinct species.

The genus *Itea,* of the family *Saxifragaceae* is just such a genus. There are about nine species on the east Asian mainland; one, *Itea japonica,* in Japan, and one, *I. virginica,* in the eastern U. S. Horticulturally the latter species, and *I. ilicifolia,* a broadleaved evergreen, are probably the best known; *I. virginica* for its brilliant red fall color, and the Chinese *I. ilicifolia* for its holly-like foliage of dark green and its four-to-ten-inch drooping racemes of greenish flowers in mid-summer.

In March of 1956 the Arboretum received seeds of another species, *I. japonica,* from the Kyoto Experimental Forest Station, Kyoto,



Itea japonica (1063-56) close-up of branch with 3-4″ panicles of white flowers, on south bank, Rhododendron Glen, in Arboretum.

Fig. 10 Photo by: J. A. Witt

Japan. Seedlings duly appeared and in November 1959 a seedling and a well rooted cutting were planted among the hydrangeas and rhododendrons in Rhododendron Glen, on a shady bank facing north.

The cutting at least has prospered and is now about eight feet tall, spreading widely. The stems are yellow-green and remind one of the shrubby dogwoods, a similarity that is carried on by the heavily veined deciduous leaves, yellow-green in color. Early this June it produced tiny white flowers, about 1/8 inch long and across, but carried in great profusion in three- to four-inch long, bottle-brush like panicles, borne terminally on short axillary shoots on the current year's wood (fig. 10).

A search through the Arboretum's library to find background material for this interesting plant was very nearly negative; two Japanese floras had pictures of it and the *Illustriertes Handbuch der Laubholzkunde* of C. K. Schneider, (1906), an author who spread his nets wide indeed, has the merest mention of it. From this lack of literature it may be assumed that *Itea japonica* is a plant very rarely cultivated outside of Japan; that it is (or was) cultivated in Japan can only be inferred from the fact that the original description by Professor Oliver in 1867 cited the source of the type material as "Nagasaki (in Hort.)" or cultivated in Nagasaki.

Since *Itea japonica* is such a rare plant in cultivation there is a botanical description below, brief, but more complete than any located so far.

Itea japonica; — a spreading shrub; old wood shining brown with gray-brown vertical stripings, newer wood bright yellow green. The deciduous leaves are yellow green above, somewhat paler beneath, puberulent on both surfaces; lanceolate-elliptic to oblanceolate, 5-10 cm. long, 2 to 4 cm. broad; tip long acuminate, base rounded to cuneate; strongly nerved, veins above impressed and anastomosing before they reach the serrate margins. Petioles shortly pubescent, at least while young, 5-10 mm. long, subtended by fugacious awn-like stipules.

(Continued on Page 93)

Northwest Members of the Ericaceae

PAT BALLARD**

FOR those who would garden with the least effort, the word "ericaceous" has particular significance. With the trend toward low-maintenance plaintings, the woodland garden has become increasingly popular and in such a setting the members of the Heath family can be most valuable. Haworth-Booth* calls them the most important group of flowering shrubs for the non-limy soil. The late A. T. Johnson* wrote countless words describing their charms and the ways of using them in the garden. Royton Heath* lists many not yet generally grown in our part of the world.

The members of Arboretum Unit 60 (the Ericaceae Study Group) devote most of their efforts to the study of this one plant family. During the last ten years they have been meeting several times a month reading pertinent literature, growing ericaceous species from seeds and cuttings, trying them in various exposures and under quite different garden situations (from city gardens close to Puget Sound to woodland plantings twenty miles away and several hundred feet above sea level) and sharing their findings with each other. The major portion of the material for this report has been collected by them and their generous assistance is most gratefully acknowledged. Gardening friends, amateur and professional botanists and horticulturists, have been more than willing to answer questions. The professors of the University of Washington Department of Botany and the Arboretum staff have made it possible for us to refer to many publications not usually available to the average gardener and we are deeply grateful.

The Pacific Northwest has a naturally acid soil, in most areas, and the ericaceous plants, generally speaking, want a non-alkaline soil, mild temperatures and a humid atmosphere. They are naturals for Northwest gardening. They need no special soil additives, other than a woody or peaty mulch and, only occasionally, a little fertilizer.

Western members of the Heath family, in the traditional concept of the *Ericaceae,* range in type from woodland saprophytes to the majestic madrona *(Arbutus Menziesii)*. These two extremes are much more difficult to bring into the garden than the stoloniferous groundcovers and other ericaceous shrubs that grow in this land of plenty. We are confronted with such an embarrassment of riches that, when we begin to consider using them in our gardens, we find it difficult to make a choice among the many varieties and forms.

There are botanists who feel that the pyrolas are so distinct from other genera of the *Ericaceae* that they deserve separate billing. They place them in the *Pyrolaceae* and put the non-chlorophyllous, fleshy saprophytes in the *Monotropaceae*. The blueberries, too, are thought by the "splitters" to rate a category of their own—the *Vacciniaceae*. We will follow the philosophy of the "lumpers" and treat them all as members of the *Ericaceae*.

Most members of this family want some shade and resent having their root-runs dry out. Many will, eventually, produce shade for their own roots. Almost every member of the family responds favorably to decaying wood, either in the soil or as a mulch, and some of them will send long stolons through a disintegrating log.

Though this family is known to have a preference for a low pH concentration in the soil, plant collectors have noted that certain members of the family have been found growing on or near limestone. It is sometimes difficult to ascertain whether they are growing in humus that has collected on the limestone or whether the rock formation has cracked and allowed a bit of soil to gather. Two Northwest growers tell of finding *Rhododendron lapponicum* growing over limestone,

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*See bibliography at end of this article.

**Mrs. (Page) Ballard is presently the chairman of this most industrious Ericaceae Study Group.

with the roots actually penetrating the rock, and of finding *Vaccinium ovatum* growing near a large lime works, with lime dust on its foliage and seeming to suffer not at all. They speak of vegetation apparently not varying from the norm, where there are outcroppings of limestone and they wonder if there is more of a problem where the lime occurs in the water supply than when it is found in the soil only. There is not a great deal of limestone in our region and most of it is found in the drier areas. All of this opens up new opportunities for research and it keeps us from becoming too positive of just what is happening in the plant world.

British gardeners have been using ericaceous natives of the Pacific Northwest ever since David Douglas collected seeds for the Royal Horticultural Society, more than one hundred and thirty years ago. We may read in his journal* of his enthusiastic reaction to our native plants. *Gaultheria Shallon* (salal) was the first plant he held in his hands after he came ashore at Cape Disappointment at the mouth of the Columbia River.

For those who would like more information and detailed descriptions we recommend the many references cited in the accompanying bibliography. We are confining our remarks in this report to those ligneous genera and species included in Dr. C. Leo Hitchcock's treatment of the *Ericaceae* in the *Vascular Plants of the Pacific Northwest,* Part 4, published by the University of Washington Press, 1959.

Andromeda Polifolia L. 1753—bog rosemary—Found in sphagnum bogs and acid marshes, from Labrador and Newfoundland to Alaska and British Columbia, south to Washington and northern Idaho, and in Eurasia. Dr. Hitchcock* says this species has been reported in our area but he has not seen confirming specimens. Low, spreading, evergreen shrub, between 4 and 12 inches tall (the plants which we have seen have not been over 6 inches tall). One member of the study group is growing four different forms of this species. Another has collected it in Alaskan muskegs, and Dr. Adam Szczawinski* includes it among the ericaceous plants of British Columbia.

W. H. A. Preece* says bog conditions are not essential—that it will thrive in any cool, peaty situation, though it will take more sun if its roots are in, or close to, water. We have found that it does well under those same conditions that we give rhododendrons. Dr. Hitchcock mentions several forms—var. *angustifolia,* var. *minima,* and var. *nana.*

Like so many members of this family, these plants respond to a mulch (peat, leaf-mould, *old* alder, Douglas Fir or hemlock shavings or coarse sawdust). May be propagated by cuttings June-August, layering in August, seeds in February or March, division in early spring. Not to be confused with *Andromeda japonica,* the "lily-of-the-valley shrub" of the nurseries, which is really *Pieris japonica.* Grown quite generally in the Seattle area. Hardiness, Zone II.

Arbutus Menziesii Pursh (1814)—madrona or Pacific Madrone. Evergreen tree, sometimes shrubby in form, from 20 to more than 100 feet tall, lacquer-red outer bark that shreds, exposing glossy, chartreuse-green, inner bark. Dark green leaves are serrate when young—to 6 inches long. Panicles of small, white, urn-shaped flowers in May. Fruit is a many-seeded, orange-red berry that is eaten by gamebirds and songbirds, particularly band-tailed pigeons and varied thrushes. One of the most handsome of the western American natives, but difficult to move and not grown as often as it should be. It is almost never found in nurseries. Seedlings, transplanted into cans or flats, when only a few inches tall, have grown on in cold frames for several years. We would suggest that they be planted permanently as soon as possible. Perhaps an underplanting of salal would hide the fallen leaves that trouble some gardeners. Found in dry, rocky, well-drained soil from B.C. to California. Probably would do better with some wind protection. Zone VII.

Arctostaphylos columbiana Piper (1915)—manzanita or hairy manzanita—*A. tomentosa* of several authors but not of Lindley (1835). An erect or spreading shrub to six feet or more with persistent leaves and smooth, cinnabar-red bark. Inclined to be a bit unpredictable in the garden. Some gardeners have little trouble with it—others watch it die away, branch by branch. We have one plant that has survived winters during which others of this species, growing within inches of it, succumbed. Why? We do not know. In some areas, particularly on the Olympic and Kitsap Peninsulas, there are intergrades between this species and *A. Uva-ursi.* One, known as *A. media,* forms an excellent groundcover (taller growing and greyer leaved than *A. Uva-ursi*). It almost never produces any fruit. Like their parents these hybrids will grow in dry, gravelly soil, and in sunny situations, but may need extra watering and mulching, during the first year. Some propagators suggest taking cuttings in February. Zone VI?

A. nevadensis Gray (1878)—pine-mat manzanita—common in the Cascade Mountains (Szczawinski* does not mention it as occurring in B. C.). In one area, east of Snoqualmie Pass, we found several quite distinctive variants—some evidently the result of differing environments and others seemingly genetically induced. In one mass of a small, narrow, pointed-leaved form there was a plant with such large, round-apexed leaves and vigorous growth that it looked like the *A. media* of the Olympic Peninsula. Dr. Hitchcock* mentions intergrades between *A. nevadensis* and *A. Uva-ursi.* If our specimen was such a hybrid form, it was more

lush in its growth than either parent or than any other of its kind in that region. Most of us have found *A. nevadensis* more difficult to grow than *A. Uva-ursi;* perhaps it resents our moist, lowland climate. Zone V.

A. patula Greene (1891)—fairly common in the mountains of Oregon and California—reported in Washington but we have not contacted anyone who has actually seen it here. Evergreen shrub to 6-8 feet tall. Smooth, bright green leaves. Glossy, dark brown or nearly black fruit. We have tried to grow it without success. It dies away in a couple of years. Zone VII? (Fig. 11)

A. Uva-ursi (L.) Spreng. (1825)—bearberry or kinnikinnick. A desirable, dark green leaved, reddish-stemmed, matting ground cover. Though sometimes a bit difficult to establish, it makes a good cover for a hot, dry bank. A landscape architect once suggested that bank plantings will not wash away if each small plant is placed in a tin can from which both ends have been removed. By the time the plants need more root room, the can will have rusted away. The Indians used the leaves for smoking and the traders and early settlers extended their precious pipe-tobacco supply by adding dried leaves of kinnikinnick. The berries are eaten by bears, birds, and man (if he is hungry enough). They are mealy and are said to be more palatable when cooked. Propagate by seeds in February, by cuttings in August, or by removing layered branches almost any time of the year, except during very dry weather. Some authorities say that many of the evergreen members of the Heath family may be grown from winter cuttings. Taylor and Hamblin* advise two-inch long, softwood cuttings in July, in sand (or in peat and sand)—longer cuttings in late fall—layering in the summer, or seeds, removed from pulp and sown out of doors ¾-inch deep; all of these, they say, are successful means of propagation for this species. Bright red fruits are eaten by gamebirds and deer browse on the tips of the branches. Zone II.

Cassiope Mertensiana (Bong.) G. Don (1834)—white mountain heather. An evergreen, mat-forming, alpine shrub. There are two variants of this species in the Northwest; var. *Mertensiana,* with puberulent stems and pedicels, is found in the Cascades; var. *gracilis,* with glabrous stems and pedicels, and minutely ciliate leaves, is found from northeast Oregon to Montana. Its branches are slender, resembling *C. lycopodioides* of northern Japan and Alaska, but its branching pattern is more open. The white, bell-shaped flowers of both type and variant come in April-May in lowland gardens, July-August in their natural habitats. Sow seeds in October and take cuttings from July to August (one of the study group says she takes cuttings whenever children or dogs break off a piece). Considered to be difficult by many gardeners. Good drainage is important but cassiopes must never be allowed to dry out. The leaves on the lower stems turn brown but hold on indefinitely—this seems to be typical of this species, both in the wild and in the garden. Zone V. (fig. 12)

Cassiope Stelleriana (Pall.) D. C. (1839)—known also as *Harrimanella Stelleriana* Colville—moss heather or Alaska moss heather. Spread-

Below—

Arctostaphylos patula; near Dutchman's Peak, Jackson Co., southern Oregon. Plant 3 ft. tall; flowers pink.

FIG. 11 PHOTO BY B. O. MULLIGAN, JUNE 25, 1955

ing, evergreen shrublet to 4-6 inches. The leaves are more linear and spreading than those of other cassiopes, the flowers more open, upright or nearly so. It is found in alpine meadows and bogs in the Hudsonian Zone, from western Washington north to Alaska, and in Japan and N.E. Asia. Mansfield* says this species prefers a sandy, peaty soil in some shade and may be propagated by seeds in February. One of our members says she has rooted cuttings taken any time from late June to August.

C. tetragona (L.) D. Don (1834)—white mountain heather or Lapland heath. Low, evergreen, alpine shrub, 2-6 inches tall. Circumboreal; one authority says that in western North America it is found as far south as Oregon; another says its southern limit is Okanogan County, in Washington. Dr. Hitchcock* says that specimens from this latter area are "referable to the var. *saximontana* (Small) C. L. Hitchc." and have smaller flowers and shorter pedicels than the Alaskan var. *tetragona*. Dr. Szczawinski* advises careful use of a lens to prevent confusing this species with *C. Mertensiana*. On most specimens the definite groove on the back of the leaves is an identifying characteristic. The foliage is usually much darker than that of other species. Propagate by cuttings in July and seeds in October. Gabrielson* stresses the need of good drainage and plenty of moisture through the growing season. Our own cassiope expert says this is the "most difficult of all cassiopes."

Chimaphila Menziesii (R. Br.) Spreng. (1825)—western pipsissewa or prince's pine. Evergreen shrublet, 2-6 inches tall, with leaves mostly elliptical and usually smaller than those of *C. umbellata*. Both pipsissewas seem to respond to a cool root-run along an old log. Gabrielson* says it requires a shady situation, with plenty of leaf-mold or forest-duff to keep it happy. We have found that it grows well in the shade but does not bloom heavily; if we give it enough sun for satisfactory flowering, it sulks and fades away. It is found in coniferous woods in the Canadian Zone, from B. C. to California and east. reputedly, to Montana. Like so many other members of this family, it needs liberal watering during the growing and flowering periods. Zone II?

C. umbellata (L.) Bart. (1817)—prince's pine or pipsissewa. An evergreen. woody perennial with a long, bare runner—the leafy stem may come through the forest duff many inches from the feeding-end of the roots, making it difficult to transplant this species successfully. Collecting directly into a flat filled with soil from the habitat, covering it with plastic (immediately) and placing the flat in a cold frame for several weeks, or over the winter, has been a successful method for us. W. H. A. Preece* suggests establishing in pots before planting in the garden and says the plants should be planted out in early autumn or early spring—he stresses the need for shade and advises the use of equal parts of well-rooted coniferous refuse and leaf-mold. with a "dash" of peat. Propagate by cuttings. in sand and peat. in the late fall. Heath* says "green cuttings in June." Found in coniferous woods, in the Humid Transition to Hudsonian Zones, from Alaska to southern California to eastern U. S. and Canada, and in Eurasia. Dr. Hitchcock*

(Continued on Page 91)

Below—

Cassiope Mertensiana (and *Phyllodoce empetriformis*) in Martin's Park, Olympic National Park, Washington. July 25, 1962.

FIG. 12 PHOTO BY B. O. MULLIGAN

Dormant Sprays for Trees and Shrubs

DAVID H. BRANNON*

THE discovery of many new synthetic pesticides during the past ten or fifteen years resulted in a serious decline in the use of dormant sprays. It was thought by some that an application of one or two of these new materials during the spring or early summer would end all of our pest control problems. It was soon discovered, however, that these newer materials had definite limitations and further that many kinds of insects were becoming tolerant or developing resistance to them. As a result, dormant sprays, which were being omitted from the pest control programs, are coming back into favor. This is good, since sprays applied during the late winter and early spring make possible more effective control of some of our most injurious pests and seem to aid in preventing the development of others which often appear when dormant sprays are not applied.

Dormant and Delayed Dormant Sprays

The term dormant applies to the condition of the tree or shrub during the winter—it is in a resting or practically non-vegetative stage. Sprays applied during this period are called dormant sprays. Sprays applied at a little later period, when the buds are beginning to open and the tips of the leaves are showing, are called delayed-dormant sprays. Dormant and delayed-dormant sprays are about equally effective in controlling pests, but there is more risk in applying delayed-dormant sprays since leaf growth has started. For control of certain diseases, such as peach leaf curl, the spray must be applied when the tree is dormant.

Materials for Dormant Sprays

The materials used in dormant sprays are oil, liquid lime-sulfur, sodium polysulfide, Bordeaux mixture or a combination of oil plus lime-sulfur. The active ingredients in Bordeaux mixture are lime and copper sulfate.

*Extension Entomologist, Washington State University, Pullman, Wash.

Because these materials are applied when trees or shrubs are in a dormant condition, they can be applied at a higher concentration than would be safe at any other time of the year. Applied later in the season, they would seriously damage the foliage and fruit.

Precautions in Using Dormant Sprays

Certain precautions must be observed in using dormant or delayed-dormant sprays. Do not apply them during freezing temperatures or when temperatures are likely to drop to freezing before the spray has had a chance to dry. Do not apply while it is raining or likely to rain within a few hours. Rain will dilute the spray material and reduce its effectiveness. The use of dormant strength oil or combination oil plus lime-sulfur sprays on conifers can be hazardous since oil injury may occur. Lime-sulfur sprays are safe but care must be taken not to get the spray on the walls of homes or buildings as it will cause a yellow discoloration. Dormant sprays properly applied are safe to use on fruit trees and other deciduous trees and shrubs.

Availability of Spray Materials

Lime-sulfur, dormant oil and the lime and copper sulfate for preparing Bordeaux mixture are usually available from places handling agricultural and garden supplies. Recommendations for lime-sulfur are usually based on a density reading of 32 degrees Baumé. Sodium polysulfide may be used in lieu of lime-sulfur.

If a number of trees are to be sprayed, it is probably better to make your own Bordeaux mixture. The usual formula for this spray is 8-8-100 and requires 8 pounds of bluestone (copper sulfate) and 8 pounds of freshly hydrated or slaked lime for each 100 gallons of water. Smaller quantities of Bordeaux mixture may be prepared by changing the formula to 1-1-12½. Commercial preparations of Bordeaux mixture are available but it is important that they be freshly pack-

aged since the lime has a tendency to deteriorate in storage.

Recommended Dosage for Dormant Sprays

Lime-sulfur is used at the rate of 11 gallons to 100 gallons of water, or 2½ pints to 3 gallons of water. The lime-sulfur plus oil combination spray consists of 3 gallons of lime-sulfur plus 2 gallons of 80 per cent dormant spray oil per 100 gallons of water. For three gallons of spray, this would require ¾ pint of lime-sulfur and ½ pint of oil to 2½ gallons of water.

Pests Controlled With Dormant or Delayed-Dormant Sprays

Several major pests of fruit trees and ornamental trees and shrubs are effectively controlled by dormant or delayed-dormant sprays. Scale insects, such as oyster shell, San Jose, lecanium, European elm, soft brown, cottony maple, juniper, holly, black pine leaf, rose and pine needle scales are all controlled with dormant applications of either lime-sulfur or dormant oil sprays or a combination of both.

Several kinds of spider mites, such as the European red mite, the brown mite and the spruce mite which pass the winter in the egg stage on the tree, are also controlled by either lime-sulfur or dormant oil.

Blister mites and rust mites are controlled by a lime-sulfur spray.

Many different kinds of aphids or plant lice pass the winter in the egg stage on fruit trees and ornamental trees and shrubs. A dormant oil spray destroys the viability of these eggs and kills any aphids which may be present.

Bordeaux mixture is recommended as a spray for peach leaf curl and *Coryneum* blight which attacks apricots, peaches and cherries. Sprays for peach leaf curl must be applied before the buds swell. Dormant lime-sulfur sprays are moderately effective on *Coryneum* blight on peaches and cherries, but cannot be used on apricots because of possible injury. Lime-sulfur applied during the dormant period aids in controlling pear scab. Sprays applied at this time, however, are not effective against apple scab. Lime-sulfur sprays during the dormant period are recommended for control of cane blight and powdery mildew on roses. A dormant lime-sulfur spray is also a general clean-up spray for control of mosses, lichens and algae.

Materials recommended for dormant sprays are safe for the applicator to apply and leave no poisonous residues on the tree or fruit. While a dormant or delayed-dormant spray does not provide control of all insects and diseases, it does provide early season control of several diseases and also materially reduces the early development of insect populations, thus making it much easier to control them later in the season.

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members (June 8 through September 10, 1963): *Supporting* — Mrs. Edward B. Harper. *Contributing* — Gordon N. Scott, Lane Summers. *Sustaining* — Mrs. Thomas E. Moffett, Richard Yamasaki. *Annual* — Miss S. I. Anthon, Mrs. Paul Bennett, Mrs. R. C. Bennett, Mrs. Eric Berkeley, Gordon N. Brennen, Mrs. Myrtle E. Chester, Mrs. Arthur C. Crookall, Mrs. Luther J. Cummings, Mrs. Jesse Epstein, Mrs. Norman Gessley, Mrs. Robert C. Goelz, Miss Rebecca Gold, Mrs. W. L. Grill, Mrs. W. H. Hartung, Mr. and Mrs. George B. Helgeth, Mrs. F. T. Isaacson, Mrs. Robert D. LaBounty, Dr. and Mrs. James J. Lane, Mrs. Warren B. Lee, Mrs. Dean Lewellen, Mrs. Jerry T. Matthews, D. K. Merkeley, Mrs. Reed A. Morrow, Mrs. George J. Mullaney, Mrs. George Oba, Mrs. A. T. Olson, Mrs. Clarence C. Pearson, Emma Peterson, Mrs. J. Finlay Ramsay, Mrs. Brian C. Scheuch, Gladys I. Sides, Harold V. Smith, J. W. Stephenson, Mr. and Mrs. Loren B. Stone, Mrs. Dean P. Stowell, David Tripple, Mrs. Edward L. Turner, Mrs. Harlan Van Wyck, Mrs. Leon E. Wagner, Mrs. C. T. Watson, Mrs. Milo F. Wilcox, Mrs. Albert S. Young.

We are also most grateful to the following members who have increased their dues to: *Supporting* — Mr. and Mrs. Howard H. Wright. *Contributing* — Mrs. Andrew Price. *Sustaining* — Mrs. J. Swift Baker, Mr. and Mrs. Ray Brandes, Mrs. Allen E. Senear, Mrs. Warland Wight.

The Arboretum Bulletin

VOL. XXVI, NO. 3 SEATTLE, WASH. FALL, 1963

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To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and THE BULLETIN will be discontinued.

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All memberships are non-assessable.

Garden Work in the Fall

THE three months of October, November and December usually provide the best period of the year for planting or transplanting trees and shrubs, especially the evergreens, both broad-leaved (rhododendrons, camellias, hollies, viburnums, etc.) and conifers (pines, firs, spruces, junipers and others). This is because the soil is warmer after the summer than it will be in February or March and the newly planted tree will make fresh roots and become somewhat established before the winter sets in. Leave the deciduous types until later—after Christmas if necessary.

Take time to consider what kind and size of plant is needed in any particular position, then prepare the site thoroughly by digging a large enough hole (at least two feet wider than the spread of the roots is desirable), loosening the bottom with a fork, adding some form of humus such as mixed compost, old rotted leaves or peat, especially if the soil is light and sandy or gravelly. No fertilizer is necessary at this time; wait until the plant starts to grow next spring, and then be sparing with it. If it is a tree, drive a stake in the hole, on the windward side, before covering the roots. Fill in by degrees and firm each layer of soil as you proceed; don't wait until the hole is almost full or air pockets will be left in the lower levels. Tie the tree firmly but not too tightly; there is likely to be some settling during the winter. Twice around the stake for each time around the tree is a good rule; a piece of old hose is an excellent support, running the cord through it.

New Lawns

If you need a new lawn, September and October are excellent months to sow it, but if the ground is not yet prepared you'll have to hurry. Cool nights with heavy dew or morning fogs, and warm sunny days make the grass germinate and grow quickly; they also put the color on the apples. Important points in forming the lawn are: (1) If the soil is poor, add peat or other weed-free humus before sowing; again, let the fertilizer wait until early spring, having enough natural food in the top

three inches of soil to carry the grass over winter. (2) Get as smooth and even a surface as possible, by repeated raking in different directions. (3) Sow the seed in strips about a yard wide, preferably in both directions to get thorough coverage. (4) Buy a good seed mixture, without rye grass; it is well worth the extra cost if you want a good lawn.

Pruning

This can be started, in the case of deciduous trees, just as soon as the leaves fall—or even before then, if you have a large number of apples and other fruit trees which should be sprayed later in the winter.

Go over them systematically with a pair of heavy pruners (about 20 inches long) and a small, preferably folding type of pruning saw. Take out all dead wood, all or part of any crossing branches, keeping the center of the tree open in the case of most fruit trees. If the tree has a main leader, remove any competing leaders, and the ends of long lateral branches as well as branches too low on the tree for your own convenience and the good of the grass below.

Young trees which have produced several long shoots should generally have these shortened back one-third of their length, cutting to an outside bud; if there are too many, remove the weakest and those badly placed.

Finally, if you want to find some interesting new plants, come early to the Units plant sale at the Arboretum on Wednesday, October 2. It is an excellent source for unusual material. B.O.M.

Leaves From The Arboretum, III

Richard B. Walker*

Why Do Leaves Fall?

THE falling of leaves is most obvious during the autumn, when deciduous plants drop all of their foliage. However, this process is taking place all the time in most plants, as occasional leaves detach and spin to the earth. Even with needle-leaved evergreens, there is a more or less steady "rain" of leaves, mostly from portions of the foliage which are several years old. This can be observed by placing a pan or screen under such a shrub or tree for a few days. The amount of the leaf "litter" so collected can give an interesting idea of the contribution of the vegetation to the organic matter at the surface of the soil. What is known about the causes of leaf drop and the mechanics of the process?

Causes of Leaf Fall

Hormonal principles: Long ago it was observed that cutting of the terminal buds or terminal shoots from a plant often delayed or prevented leaf fall from the balance of the plant. This observation gave rise to the idea that a plant hormone produced in terminal buds causes the fall of leaves.

This appeared to be at odds with the results of another frequently performed experiment, in which the removal of the leaf blade causes its petiole (leaf stalk) to fall off soon afterwards. The fall of the petiole can be prevented in this experiment by applying an auxin-type hormone to the end of the petiole where the blade has been removed. This apparently shows that leaf fall is prevented by the natural formation of such a hormone in the normal leaf blade.

At present it is reasonably certain that the fall of a leaf does not occur as long as its blade produces a sucient amount of auxin (hormone) to counteract the effect of hormone which is constantly moving downward from the terminal buds. However, if a leaf blade for any season ceases to produce a sufficient amount of auxin, then the leaf shortly fall off under the influence of the hormone from the terminal buds.

Leaves Which Fall Are Abnormal: In accordance with the above theory, a leaf might be expected to fall when its production of auxin (hormone) drops for some reason. A wide range of factors may cause leaf fall,

*Chairman, Dept. of Botany, University of Washington.

apparently because they reduce auxin synthesis in the blade of the leaf. Thus drought, over-watering, disease, mechanical injury, mineral deficiency, air pollutants, reduced day length and other season changes, all may induce the loss of foliage. In addition, the lower and older leaves of plants frequently fall in a more or less regular sequence; this apparently being a consequence of aging rather than being caused by environmental influences.

Abscission layers: In many plants there is a special region near the bases of the petioles of the leaves which is important in leaf fall. This region of cells, called the abscission layer, does not completely mature. Sometimes leaf fall (abscission) is preceded by cell division in this region. In addition, weakening of the petiole often occurs through dissolution (presumably by enzyme action) of cell walls in the abscission layer. In any case, mechanical strains from drying or wind usually are involved as well as these cellular changes. After the leaf falls, loss of sap is prevented by the formation of a thin layer of cork tissue over the scar. *(Cont. on Page 89)*

Performance Evaluation of Landscape Trees

(Continued from Page 68)

nus, and one in the Interior Valley is planting twenty of them. In these two plantings, differential treatments of soil aeration and fertility are being made with the assistance of the local farm advisor.

In conclusion, such a long-range performance evaluation of landscape trees is possible only through the excellent support of the participants. Their costs in purchasing the more than 1,300 candidate trees already planted amount to well over $4,000. This, plus their costs of planting, staking, and caring for the trees represents a grant-in-aid to the LTE program of considerably more than $10,000. Hopefully, the information derived from this research will ultimately focus attention on more of the better kinds of trees that could enhance the urban landscape.

Some of Our Favorites☆

☆Won't You Send Us Yours?

The Hostas, or Funkias

RICHARDSON WRIGHT, at one time editor of *House and Garden,* wrote, "The shady garden is among the least of God's mercies." Having had a shady garden for most of my garden life, I disagree with this opinion. He called the soil "sour"; acid seems a more pleasant word. He said, "A shady garden is usually the despair of those obliged to have it." Then he named some of the precious plants that prefer such a situation: Rhododendrons, azaleas, primroses, lilies, narcissus, anemones and others. Without these a gardener is deprived of many important and beautiful blooms and plants.

To select only one group that prefers a shady spot there is *Hosta* (my grandmother called them Plaintain Lilies). The blooms, reaching well above the foliage, are not ostentatious but exquisite, growing in pointed clusters, blue, white and lilac. Ten species came originally from China and Japan.

Hostas, or Funkias, belong to the vast lily family with tuberous basal rhizomes from which spring clusters of leaves. The leaves vary in shape, size and shades of green. I know a garden where a large-leaved Hosta is planted in the corner of a right-angled turn of a fence. It is a perfect spot where the mighty, glaucous, heart-shaped leaves, 12 to 15 inches across, make a picture worthy of any modern art exhibit.

They give substance and variety to the summer and fall garden. They are easy to grow and seldom fail to appear with great leaf buds in early spring. They are unassuming, not requiring fancy attentions. They are reliable, filling spaces that may otherwise be problems in a shady garden.

GRACE T. DOWLING

Sciadopitys Verticillata

THE Umbrella Pine, *Sciadopitys verticillata,* is an interesting and handsome evergreen tree. It is not a pine or a spruce as its name implies but one of a large group of conifers in the *Pinaceae* or Pine Family. A native of Japan, it was introduced to the western world about a hundred years ago. It is described, and there are fine drawings of the flowers, fruits and leaves in Siebold and Zuccarini's *Flora Japonica* (vol. II, 1870). However, I think Thunberg undoubtedly brought dried specimens from Japan to Europe during his lifetime, but thought it was a yew. In its native habitat, *Sciadopitys* will attain a height of a hundred feet or more, although I doubt if it has grown to more than thirty feet in this vicinity as it develops very slowly. It is hardy in Rehder's Zone 5, or geographically, to southern New Hampshire and around Lake Erie in the east, to eastern Washington and Oregon in the west. It derives its name from *sciados* (umbrella) and *pitys* (pine). *Verticillata* refers to the needles or leaves which are verticillate, that is growing in whorls around the branches. There are, however, two sets of leaves;—the others are small brown scales which appear along the branches between the whorls. These whorls consist of from fifteen to thirty-five needles about four to five inches long and are narrow, slightly indented on the ends and grooved on both sides. The upper side is dark glossy green and the under pale greenish white. The whole appearance is a graceful and very ornamental pyramid. The branches are beautiful in decorations with either flowers or Christmas ornaments.

It grows best in moderately moist soil. In dappled shade, the leaves are a lusher green contrasting attractively with the golden branches and flowers. Because of this coloring, the Chinese called the tree Kin sjo, meaning golden fir.

I have had five of these trees in my gardens, three on Bainbridge Island. These were approximately 50 years old. The former owner, Mr. J. D. Lowman, had brought many fine plants from Japan early in this century and these undoubtedly were among the imported ones. The tallest was about twelve feet, narrow and contorted, growing in a hot dry spot. It was interesting but not as pretty as the other two which grew on a steep bank under a grove of firs where it was very shady, dry in summer, wet but well drained in winter. I do not remember, however, whether the bark on the latter was golden. The contorted one in the sun produced cones but the ones on the bank did not. *Sciadopitys* is monoecious but the flowers are dioecious, being individually male and female, not having pistils and stamens in the same flower.

In my present garden, which I have had only four years, I planted two. One was in a hot, badly drained bed and died very shortly; the other, put in well drained soil in partial shade, is now about five feet, quite bushy, a good dark green and lovely golden bark. I think at first I watered it too much because the new growth looked too soft so now I turn off the sprinklers in that bed about the middle of July. It gets sufficient moisture from the lawn. It flowers but as yet has not produced cones. Perhaps it is too young.

I believe most gardeners would be happy to have a *Sciadopitys* in their garden and it is unfortunate they are not more universally grown. They are still somewhat rare, but can be found in local nurseries.

—Mary Winslow

Control of Leaf Fall

(Continued from Page 88)

Although leaves inevitably fall off as they become old, their retention on the plant can often be prolonged by proper care. Thus, normal attention to an adequate but not excessive supply of water, proper soil fertility, control of leaf diseases, and avoidance of overcrowding or excessive shade, will guard against premature dropping of leaves. Plants receiving such care will be full foliaged, which is an advantage not only in appearance but in their manufacture of food, which influences general vigor and flowering.

BOOK REVIEWS

"The Oxford Book of Garden Flowers"; text by E. B. Anderson and others. Oxford University Press, London, 1963. Price (in Great Britain only) 35 shillings.

THE Oxford Press has long held a reputation for superlative productions of garden books and this, published in 1963, is no exception. They call it a companion volume to *The Oxford Book of Wild Flowers.* It contains ninety six pages of illustrations, over five hundred subjects, shrubs and plants, chosen, without doubt, by knowledgeable gardeners with fine taste. The text is the combined efforts of several important English gardeners.

Botanical as well as common names are given. The illustrations have been painted from living plants with strong, life-like colors, while the foliage has been arranged to show its natural growth.

Each flower illustrated is labeled with a number corresponding to a thumbnail sketch on the facing page; a quick and easy descriptive paragraph, giving the plant's botanical and common name, its original home, the soil it prefers and the names of some of its relatives, besides some of its idiosyncrasies.

At the end of the book there are articles by authorities on planning a garden; lists of plants for special soils; lime-hating plants; plants for north walls, and others. The general pattern of the book is seasonal, showing plants from spring to late fall.

In short this is a beautifully illustrated garden encyclopedia for reference, answering many vital questions.

G. T. D.

* * *

Seaside Gardening, by Christine Kelway; W. H. & L. Collingridge Ltd., London, 1962, price 35 shillings.

ANYONE with the problem of selecting material to grow by the sea would do well to study this useful book by Christine Kelway, third generation member of a very distinguished family of horticulturists in Great Britain. Information of this sort is difficult to acquire and books on the subject are uncommon. She has gleaned essential information in a region where men have been fighting the elements for hundreds of years to maintain their seaside gardens.

It is interesting to note that there is a Horticultural Experimental Station at Rosewarne, Cornwall, which tests trees and shrubs for hardiness. As much as one hundred pounds of salt deposit per acre per annum has been recorded here.

Christine Kelway lists plants to use in the first line of defence, then details other plants which do well near the sea. Wind, salt and desiccation are responsible for most plant injury. She advises on how to protect plants with shelter, windbreaks and hedges. Spring planting using small plants is recommended. A study of local conditions and vegetation is suggested. Natives which do best on the most exposed positions on Vancouver Island in our experience would include *Picea sitchensis, Shepherdia canadensis, Malus fusca (diversifolia), Alnus rubra, Prunus emarginata, Pinus contorta* and some of the willows. It is to be noted that even some of the plants she lists for the colder parts of Britain are not hardy here. Her detail of procedures in planting and protecting are noteworthy.

Many trees and shrubs are utilized on this continent which get scant reference or none at all in her book. One omission is the Japanese black pine *(Pinus Thunbergii)* which does well in the front line of exposure, even on clay. It grew well for us for twenty-five years until the unseasonable frost of November 1955 when it succumbed. It is one of the best on the east coast of the United States.

No comment on this subject would be complete without reference to the excellent article written by Mr. J. R. B. Evison, Superintendent of Parks and Gardens, County Borough of Brighton, England, in the April 1963 issue of the *Journal of the Royal Horticultural Society*, London. He discusses in some detail the action of the wind in relation to screens and fences and refers to earlier articles on the same subject published in the same *Journal.*

W. H. WARREN
Park Administrator, Victoria, B.C.

Shrubs for the Rock Garden

(Continued from Page 73)

cherries to bloom. There is a fine pink form of it. *Leucothoe Davisiae* grows well in full sun. This is a fine native shrub, found in the mountains of southern Oregon and northern California but not too often seen in gardens. It deserves more recognition.

A big cedar stump in the lath house has been shaped to a miniature rockery and planted to *Gaultheria nummularioides,* the creeping form of *Rhododendron radicans, R. Sargentianum,* a form of *R. Forrestii,* and other small shrubs.

Our largest display bed, under the shade of high firs, is planted with more than a hundred types of dwarf rhododendrons, both hybrids and species. Many of these plants are from ten to twenty years of age. Perhaps the most difficult spot in the garden is at the base of a big cedar. Few plants will do well among this mass of roots. But *Leucothoe Keiskei* and several forms of native gaultherias are happy there, as is our native maiden-hair fern and the true solomon seal. *Ilex crenata* 'Helleri' does extremely well and a twenty-five-year-old plant of *Rhododendron* 'Jock' grows less than ten feet from the trunk of the cedar.

One of our interesting *R. Williamsianum* hybrids is a new cross made by George Grace

and grown by us, 'Bow Bells x 'Day Dream', a fine pink with quite flat flowers, eleven four-inch flowers in a truss. Ite has been named 'May Song'. 'Dainty Jean', another new *R. Williamsianum* hybrid, bloomed extremely well this season. At eight years from seed, it makes a rounded mound less than two feet tall. The buds are a lovely pink, opening to light pink flowers which quickly change to white, six three-inch flowers to a truss. It does well in a very warm spot, exposed to the sun most of the day.

More than 150 types of dwarfs grow in our garden, giving us a long season of bloom from early spring until August. Quite often some of these will throw a few blooms in the fall.

We grow quite a number of types of *Gaultheria,* fine groundcovers for a shaded, woodsy location. Most of them bloom in June and are covered with berries in the fall, in shades of blue, white, and red. *G. nummularioides,* one of the neatest growing plants, has black berries and will take considerable sun.

Among the shrubs interesting to us have been the forms of *Enkianthus*. Handsome plants, upright growing, with leaves in tiers and hanging flowers. There are a number of forms, some with cream colored flowers lined with pink, others pink or red. This year we bloomed a red with green at the base of the flower, and also a green-flowered one.

One of the most interesting trees in our garden is *Acer palmatum* 'Sangokaku'. This is a very graceful form of *A. palmatum,* has fine foliage in shades of orange and red, and then, when it loses its leaves, the branches turn red and hold that color until the new leaves appear in the spring. *Acer Ginnala* is a most graceful small maple which likes to grow as a many-branched shrub to twenty-five feet or more, rather than as a tree. Selected forms have gorgeous fall foliage. They are very useful, giving quick, light shade to rhododendrons and other plants which need it. *Parrotia persica* is another small tree we enjoy, particularly the wonderful fall foliage in shades of brilliant reds, oranges, and yellows.

Northwest Members of the Ericaceae

(Continued from Page 83)

says our material is referable to the var. *occidentalis* (Rydb.) Blake. Zone II.

Cladothamnus pyrolaeflorus Bong. (1832)—copper bush. A very distinctive, deciduous shrub with unusual copper-colored flowers that are definitely reminiscent, in form, of the pyrolas. The fresh-green leaves are narrowly oblong and some will turn yellow early in the summer, under dry conditions. Two of ours turned burnt-orange and look very dead, though there is still a sign of green under the bark. Since this has been a cloudy, rainy, cool summer it is difficult to find a reason for this unseemly behavior. Like its ericaceous allies, it wants a peaty soil and seems happier in a bit of shade. We have six seven to ten year-old plants that are between 18 and 24 inches tall, and it is hard to believe that they will ever reach the six or more feet that is said to be their ultimate size. Propagate by seed in February. We have not tried cuttings. Found from Alaska to western B. C. and, occasionally, on the west side of the Cascades to Northwest Oregon. Zone VI?

Gaultheria hispidula (L.) Muhl. (1813)—sometimes placed in the genus *Chiogenes*—creeping snowberry or maidenhairberry. A beautiful, miniature groundcover with small white fruits and thyme-like leaves. Found mostly in wet, coniferous woods or growing in sphagnum or peat, from Labrador to B. C. and south to northern Idaho. L. D. Hills* says that all gaultherias may be increased from cuttings. They should be taken without a heel, in April or May before flowering, soaked in a rooting compound and inserted in peat and shade frame. Pot in a peaty soil, winter in the cold frame and plant out in the spring. He advocates sowing seed in peaty soil in September. Royton Heath* said they may be layered by weighting down shoots with small stones and keeping the soil moist. We usually take rooted pieces from our gaultherias in the spring or fall, though we have taken some on a cloudy, summer day and had them take hold very well. Zone III.

G. humifusa (Grah.) Rybd. (1900)—Differs from *G. ovatifolia* in its smaller size, more thinly-textured leaves and glabrous calyx. Grows from B. C. to northern California and east to the Rocky Mts., at higher altitudes than *G. ovatifolia,* though the two sometimes hybridize in the Cascades. Propagate as above. Mansfield* said "by cuttings in August and seeds in February"; others say by division in spring or layering in early autumn. Once established it spreads well through a woody mulch; in the garden it is happier in some shade. Zone V.

G. ovatifolia Gray (1884)—slender, or Oregon wintergreen. Dr. Hitchcock* says this is the best of our native species for use as a groundcover. Those who have grown *G. adenothrix* will recognize its resemblance to *G. ovatifolia,* though the Japanese species is larger in leaf, flower, and fruit, and, according to some Northwest gardeners, much more amenable to garden conditions. Dr. Airy-Shaw* includes the species *G. humifusa, G. ovatifolia,* and *G. Shallon* in his classification of the Asian gaultherias, because of their botanical similarity to the Oriental species. *G. ovatifolia* is a bit miffy

for us and our most successful planting is under a Whitcomb cherry, on a slope to the northeast, where it is mulched with well-aged coarse sawdust. It flowers and fruits quite well here. *G. ovatifolia* grows from B. C. to northern California in varying conditions—from pine forest floor to alpine bogs, in Canadian to Hudsonian Zones. It comes well from seed, best planted as soon as it can be collected in the fall, or stored in a closed container in the refrigerator until February. We plant it in the same soil-mixture that we use for most members of this family—two parts sieved peat to one part fine sand. Wilfred Sheat* says gaultheria seed may be stored in bags in a dry place and sown in boxes of pure, finely-sifted peat moss, in February, and covered with a dusting of the peat. He suggests that the flats be covered with paper until the seeds germinate. Vigorous plants may be divided in early spring. We often take off small rooted pieces and tuck them in shady spots where the soil will not dry out. Mansfield* says cuttings may be taken in August. Zone V.

G. Shallon Pursh (1814)—salal. A most variable plant, from a bronze-leaved groundcover in the sun to an overhead shrub along the Pacific Ocean (particularly at Kalaloch Beach on the Olympic Peninsula). This makes a handsome under-planting for tall rhododendrons and other shrubs and can be used for thickets (particularly in bird sanctuaries). It may ramp away but is easy to pull up should it become too invasive. Probably in much better repute among British gardeners than those who live in the Pacific Northwest and take it for granted. David Douglas was so enamored with it that he berated himself for not carrying a living plant with him, on his long journey across the North American continent to Hudson's Bay, in 1827. Once established it will do well in full sun but must be babied along during the first year. Plants taken from deep shade are more difficult to establish in a sunny situation than those collected from a dry, baked area. Comes so easily from division that it is seldom necessary to grow it from cuttings or seeds. There are some interesting forms that might be increased vegetatively. Many Northwest gardeners are growing a natural hybrid between this species and *Pernettya, mucronata,* found by our Arboretum Director (Mr. Brian Mulligan) when he was at Wisley Gardens in England. We have grown it from seed and have several interesting intergrades in our garden.

G. Shallon fruits were an important food for Northwest Indians, who mashed "berries" and formed cakes or loaves. They are eaten by many birds and animals and make a delicious jelly (sometimes combined with Oregon grape fruits). Zone V.

To Be Continued

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New or Unusual Plants in the Arboretum

(Continued from Page 79)

Inflorescence an axillary raceme-like panicle of numerous small, white flowers, about 10 cm. long and nearly cylindric its whole length; rachis, peduncles and pedicels puberulent.

Flowers perfect, produced in early June in Seattle, Washington; sepals 5, linear, greenish, about 2 mm. long; petals 5, valvate, white, linear, about 3 mm. long; stamens 5, slightly shorter than the petals, with small globose anthers; styles 2, fused, as long as the stamens, stigma capitate, carpels 2, fused, seated on a fleshy orange-yellow disk. Fruit not seen.

Itea japonica probably has no bright future as a widely planted horticultural specimen, but it does have a charm that cannot be overlooked and when it becomes somewhat better known may take its place equally with the few other cultivated members of its genus.

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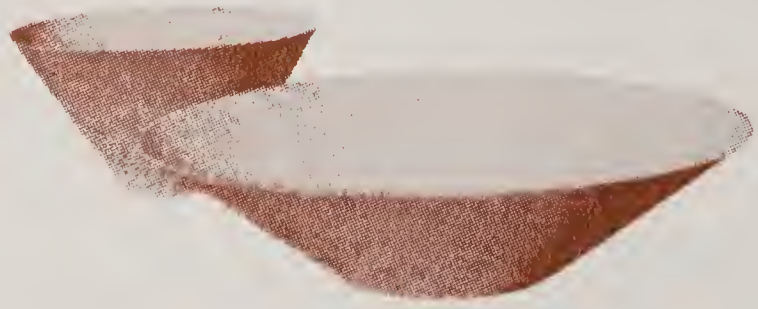

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